

CLAIMS

I claim:

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1. A color-tunable light emitter, comprising:
a first electrode;
a light-generating layer adjacent the first electrode, the light-generating layer
operable to generate light in a band of wavelengths;
10 an electro-optical layer;
a second electrode adjacent the electro-optical layer, and
a corrugated metal layer between the light-generating layer and the electro-optical
layer, the corrugated metal layer coupling a sub-band of the light from the light-
generating layer to the electro-optical layer, the sub-band having a center wavelength
15 dependent on a voltage applied to at least one of the electrodes.

2. The light emitter of claim 1, additionally comprising a diffuser layer adjacent the
second electrode.

20 3. The light emitter of claim 1, additionally comprising an optical waveguide
between the light-generating layer and the corrugated metal layer:

4. The light emitter of claim 3, in which the optical waveguide comprises a layer
having a thickness in the range from about 500 nm to about 1,000 nm.

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5. The light emitter of claim 4, in which the layer comprises a material selected from
nitrides and fused silica.

6. The light emitter of claim 1, in which the light-generating layer comprises a
30 material selected from an electro-luminescent material, a photo-luminescent material, and
a cathode-luminescent material.

7. The light emitter of claim 1, in which the electro-optical layer comprises liquid crystal material.

5 8. The light emitter of claim 7, in which the liquid crystal material is a nematic liquid crystal material and is encapsulated in a porous silicon matrix.

9. The light emitter of claim 1, in which the second electrode is transparent in the band of wavelengths.

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10. The light emitter of claim 1, in which:
the light generated by the light-generating layer has a brightness dependent on a first voltage applied between the first electrode and the corrugated metal layer; and
the center wavelength of the sub-band is dependent on a second voltage applied
15 between the second electrode and the corrugated metal layer.

11. A method for generating color-tunable light, the method comprising:
providing an electro-optical layer and a corrugated metal layer;
juxtaposing the corrugated metal layer and the electro-optical layer;
20 illuminating the corrugated metal layer with light in a band of wavelengths;
coupling a sub-band of the light through the corrugated metal layer to the electro-optical layer, the sub-band having a center wavelength; and
adjusting the refractive index of the electro-optical layer to tune the center
wavelength.

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12. The method of claim 11, in which the adjusting comprises changing a voltage across the electro-optical material.

13. The method of claim 11, in which the illuminating comprises:
30 providing a light-generating layer; and
juxtaposing the light-generating layer and the corrugated metal layer.

14. The method of claim 13, in which:
the light-generating layer comprises photo-luminescent material; and
the illuminating additionally comprises optically pumping the photo-luminescent
5 material.
15. The method of claim 13, in which:
the light-generating layer comprises electro-luminescent material; and
the illuminating additionally comprises applying voltage across the electro-
10 luminescent material.
16. The method of claim 11, in which the illuminating comprises generating the light
by one of electro-luminescence, photo-luminescence, and cathode-luminescence.
- 15 17. The method of claim 11, in which the illuminating comprises:
providing an optical waveguide layer;
juxtaposing the optical waveguide layer and the corrugated metal layer; and
illuminating the optical waveguide layer.
- 20 18. A color display, comprising:
opposed electrodes, at least one of the electrodes comprising electrode segments
defining respective color-tunable light emitters; and
between the electrodes, a layer structure comprising:
a light-generating layer operable to generate light in a band of wavelengths.
25 an electro-optical layer, and
a corrugated metal layer between the light-generating layer and the electro-optical
layer, the corrugated metal layer coupling a sub-band of the light generated by the light-
generating layer to the electro-optical layer, the sub-band having a center wavelength, the
center wavelength of each of the color-tunable light emitters dependent on a voltage
30 applied to the respective one of the electrode segments.

19. The display of claim 18, additionally comprising dielectric spacers between the electrode segments.

5 20. The display of claim 19, in which the dielectric spacers extend through the layer structure.

21. The display of claim 18, in which the electro-optical layer comprises liquid crystal material.

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22. The display of claim 21, in which the liquid crystal material is a nematic liquid crystal material and is encapsulated in a porous silicon matrix.

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23. The display of claim 18, in which the second electrode is transparent in the band of wavelengths.

24. The display of claim 18, in which both electrodes comprise electrode segments.

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25. The display of claim 24, in which, in each of the color-tunable light emitters:
the light generated by the light-generating layer has a brightness dependent on a first voltage applied between the corrugated metal layer and the respective one of the electrode segments the one of the electrodes adjacent the light-generating layer; and
the center wavelength of the sub-band is dependent on a second voltage applied between the corrugated metal layer and the respective one of the electrode segments of
25 the electrode adjacent the electro-optical layer.